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ABSTRACT

In order to study empirically measurable characteristics of the tutorial relationship between an older student and a younger student, two separate investigations were conducted during two consecutive academic years, using different third graders as tutees and college or high school students as tutors in each study. The first research investigation compared reading pretest and posttest scores of Chicanos tutored by other Chicanos in English, Chicanos tutored by other Chicanos in Spanish, Chicanos tutored by Anglos, and a nontutored Chicano control group. Results showed that tutors of the same sex have a greater influence on scores than any other group and that Chicano students did not perform significantly better with Chicano tutors. The second research investigation was not based on ethnic considerations and was devoted to arithmetic, concentrating on possible sex, school, and sub-test part-score differences. Findings comparing pretest and posttest scores of the experimental and control groups showed significant gains by the experimental group (tutored pupils) over the control group. (Appendixes include lists of schools providing tutees and tutors, materials used in the studies, and an arithmetic score sheet.) (JM)

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FINAL REPORT

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Project No. 1-H-018
Grant No. OEG-8-71-0020 (509)

# The Effect of Like Ethnic Qualities Upon Reading Tutoring of Third Graders

Glenn G. Dahlem, Ph.D.

Regis College

Denver, Colorado

March, 1973

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U. S. DEPARTMENT OF
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Office of Education
National Center for Educational Research and Development

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Final Report

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Project No. 1-H-018
Grant No. OEG-8-71-0020 (509)

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# The Effect of Like Ethnic Qualities Upon Reading Tutoring of Third Graders

March, 1973

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Office of Education

National Center for Educational Research and Development

(Regional Research Program)

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## Chapter I - INTRODUCTION

This study had its origins in the desire to shed light on empirically measurable characteristics of the one-to-one helping academic relationship between an older student and a younger one. Or, to state this focus colloquially, how best do "little kids" learn from "big kids", and why? It was decided to conduct two separate studies, one after the other, during the eighteen month contractural period. This enabled the research to be carried on during two consecutive academic years, (1971-72 and 1972-73). In both studies, third graders were used as tutees, and college and high school students as tutors. Also in each study, tutors and tutees were drawn from both public and church - related schools. No tutors or tutees from the first study were allowed to participate in the second investigation.

The first research effort focused upon the subject of reading, and in addition to asking the global question of whether tutoring "helped", also looked for possible effects of tutor sex and ethnic background. The second investigation centered on arithmetic as its academic area, and besides asking the global question, was also concerned with tutor sex and age effects, and possible differences among the academic subdivisions of the arithmetic field.

Both studies used the simple empirical model of control group and experimental group(s). Both used the same pre and post measure, the two forms of the reading and arithmetic sub-tests, respectively, of the Comprehensive Test of Basic Skills. Proper randomization procedures were employed in assigning tutees to groups, and tutors to tutees. As far as possible, orientation of tutors and tutees to the study was standardized from school to school and between the two studies. Hypotheses may be simply stated as seeking to test the null hypothesis between control and experimental groups, and among any subdivisions within these groups.

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## Chapter II - METHODS AND PROCEDURES

The research was divided into two separate investigations of the tutorial relationship. The first, conducted from November through April of the 1971-72 school year, centered upon possible ethnic-related differences in tutor effectiveness for the subject of reading. The second, conducted from September through February of the 1972-73 school year, was devoted to looking into several possible tutor-effectiveness variables for the subject of arithmetic.

Before discussing specifics of each investigation, it's possible to note several commonalities which existed for both. For example, tutors were drawn from the ranks of Regis College students, and students of three nearby public and three nearby Roman Catholic high schools in both studies. Tutees likewise were drawn from the third grades of several public elementary schools of two nearby school districts (Adams County #12 and #50), and from several Catholic parochial schools of the same geographical area. (For a specific listing of schools, see Appendix "A".) Tutor philosophy of approach was held constant as well. Tutors were instructed to do whatever they felt helped, to seek advice from the classroom teacher, principal, school district reading or mathematics consultant, and from the grant researcher. Many did. They were all cautioned to avoid continuing any one activity for too great a time span, due to attention-span limitations of third graders. Appropriate instructional aids, such as reading games and mathematics cards, were purchased and made available to all tutors. Several in-service programs were held, in which the grant researcher cooperated with school district reading and mathematics consultants. Orienting instructions during tutor recruitment were held constant. In no case was a rigid schedule of required tutor activities proscribed. All tutors were asked to work four clock hours per week or equivalent with assigned tutees whenever school was in session for the duration of their respective research investigation. Those who submitted expense vouchers were reimbursed at the rate of ten cents per mile transportation costs, plus materials, such as 3x5 cards, which they had purchased. No tutors were paid wages. All tutors save one received some form of academic "reimbursement"; high school students were allowed one-half credit toward graduation by their respective administrations; Regis College students were permitted to count their service for the aide experience required of all education students. (The one exception was a college volunteer not taking education.) Stringent disciplinary action was taken against five high schoolers and one college student who tried to falsify school attendance and go elsewhere.

Instrumentation was likewise kept uniform. Tutees were nominated for each study by classroom teachers, through their principals, on standard forms. (See Appendix "B".) As a courtesy to teachers and principals, tutees' pre and post test scores were reported back, using a standardized letter. (See Appendix "C".) Different sub-tests of the same standardized appraisal instrument, the Comprehensive Test of Basic Skills, were used exclusively for empirical data collection. Forms R1 and Q1 of the arithmetic computation, operations, and functions sub-tests were used in the second study. (For sample sub-tests, see Appendix "D".)

Statistical treatment of data was also similar in both phases. Each attached analysis through a two tailed analysis of variance conducted by Mr. Frank Farina, Assistant Professor of Economics, Regis College. In

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each study, Mr. Farina looked for effects of several possible variables: sex, school type, sub-test part scores, etc. A summary of his findings is contained in Chapter III.

The first investigation sought to compare reading pre and post test scores of Chicano third graders who had been tutored in one of three ways. To have been studied were: Chicanos tutored by other Chicanos in English; Chicanos tutored by other Chicanos in Spanish; Chicanos tutored by Anglos; and a non-tutored Chicano control group. Each tutored group was held roughly equal for same sex/cross sex, college tutor/high school tutor, and public/parochial school attended variables. The second comparison mode had to be dropped, for a most interesting reason. Not enough tutees could be found (within reasonable geographical limits) who could, or at least admit they could, speak Spanish fluently. While an adequate number of college and high school students were oriented and "ready to go" as tutors in Spanish, more than half of them reported that their assigned child protested that he or she could or would not converse in that tongue. Those tutors were instructed to switch to English. This dropped the number of tutees spoken to in Spanish below the number needed for data analysis.

The second research investigation was not based on ethnic considerations, and was devoted to arithmetic rather than reading. It was originally planned to look at effects of tutors who were good math students as opposed to poor math students, with half of each group revealing their true math ability status to tutees, and half falsely representing their math ability status to tutees. This approach was dropped for two reasons. First, many tutors protested they were neither "good" nor "bad" in math, but "middle" or "average". This caused the researcher to suspect that a resultant improper dichotomization might lead to a spurious 2x2 matrix, rendering statistical results worthless. Second, a surprising number of tutors protested that they could not mislead a child. Even when it was made clear to them that the "lie" was only for research purposes, and could be corrected after the study terminated, a great reluctance still persisted. The researcher decided to drop this approach, and concentrate on seeking possible sex, school, and sub-test part-score differences.

Of course, the results of the first study were known prior to the start of the second. As Chapter III will point out, significant findings in the same sex/cross sex area had materialized for reading tutoring of Chicanos. This naturally focused the researcher on the question whether a similar finding would result for a predominatly non-Chicano tutor and tutee population in arithmetic.

## Chapter III - RESULTS

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### A. First Research Study

The quality of education differences between schools with high Chicano enrollment and schools with high Anglo enrollments has become evident because of the systematic elimination of Chicanos from opportunities for higher education. One method of reducing this quality differential is to individually tutor those Chicano students and thus, hopefully, upgrade the quality of their education.

This study attempted to measure the effectiveness of tutoring as a method for upgrading students in the third grade or retained in second grade at selected schools in the metropolitan Denver area. Special emphasis was directed toward the type of tutor who might be most effective at tutoring.

#### Selection of Schools and Students

Thirteen schools were selected based on a subjective analysis of the income levels in the Denver area. Seven of the schools were judged to be in lower income areas, four in middle income areas, and two from high income areas. The schools contacted showed a willingness to participate in the study. A list of the schools by income is given in Appendix A.

The principals in each school, in conjunction with the teachers in the schools, were asked to submit a list of all students whom they thought would be in need of tutoring. All students chosen were Chicano. The students who were willing (because of parental pressure or self-willingness) were given the vocabulary and reading comprehension sections of the Comprehensive Tests of Basic Skills (CTBS). Either form R level 1 or form Q level 1 was administered depending on the age of the student in question.

Twenty-two students were randomly selected as a control group. The remaining sixty-three students were then tutored for six months using either college or high school tutors who were either Anglo or Chicano. At the end of this time period, all eighty-five students were then retested using the same test.

#### Sample Size

Since there were sixteen independent predictors being used in the model, a total sample size of 90 would have been preferred with a similar number available for cross-validation purposes. Since only 85 students were available in total, it was decided to use 60 students for the original run and hold 25 for cross-validation purposes. Of the 60, 11 were control students and the remainder tutored students.

#### Variables in the Model

Five basic comparisons were judged important: 1) comparisons for all students between pre and post tests for the control and experimental groups ; 2) comparisons between students who were tutored by Chicanos and those tutored by Anglos; 3) those tutored by persons of the same sex and those tutored by persons of the opposite sex; 4) those tutored in parochial schools and those tutored in public schools; and 5) those tutored by high school students and those tutored by college students. The criterion variable was the retest scores. The list of variables is shown in Table I.

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TABLE I
CRITERION AND PREDICTOR VARIABLES - READING

| | | No. of Students |
|---|---|---|
| 1. | retest scores | 60 |
| 2. | pretest scores | 60 |
| 3. | students tutored by Anglo tutors | 34 |
| 4. | students tutored by Chicano tutors | 26 |
| 5. | students tutored by tutors of the same sex | 35 |
| 6. | students tutored by tutors of the opposite sex | 25 |
| 7. | students tutored in public schools | 41 |
| 8. | students tutored in parochial schools | 19 |
| 9. | students tutored by high school students | 37 |
| 10. | students tutored by college students | 23 |
| 11. | students in the tutored group | 49 |
| 12. | students in the control group | 11 |
| 13. | interaction of pretest scores and Anglo tutors | |
| 14. | interaction of pretest scores and Chicano tutors | |
| 15. | interaction of pretest scores and tutors of the same sex | |
| 16. | interaction of pretest scores and tutors of the opposite sex | |
| 17. | interaction of pretest scores and public school students | |
| 18. | interaction of pretest scores and parochial school students | |
| 19. | interaction of pretest scores and students tutored by high school students | |
| 20. | interaction of pretest scores and students tutored by college students | |
| 21. | interaction of pretest scores and the experimental (tutored) group | |
| 22. | interaction of pretest scores and the control group | |

Analysis

The analysis was divided into two general areas: 1) to determine if the pretest scores were significantly different from the post test scores in terms of the control group and the tutored group; 2) to determine if the types of tutors and types of students had any significant effect upon post test scores. If there are significant differences between the control and experiment group, then the control group can be dropped to analyze the types of tutors and students in the experimental group.

Correlation Analysis

Tables II and III show the product moment correlations for the control and experiment groups and for the experiment group alone.

TABLE II
CORRELATIONS FOR CONTROL AND EXPERIMENT GROUPS * - READING

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | - | | | | | | | | | | |
| 2 | .72 | 1.00 | | | | | | | | | | |
| 7 | .04 | .03 | | | | | | | | | | |
| 8 | .44 | -.03 | | | | | | | | | | |
| 11 | -.13 | .01 | | | | | .04 | -.04 | | | | |
| 12 | .13 | -.01 | | | | | -.04 | .04 | | | | |

*The full correlations are found in the printouts in Appendix B.

Pretest scores explained about 72% of the post test scores uniquely, while the type of school tended to explain 44%. As will be discussed later this tended to create some problems, although the result was not surprising.

CHART I

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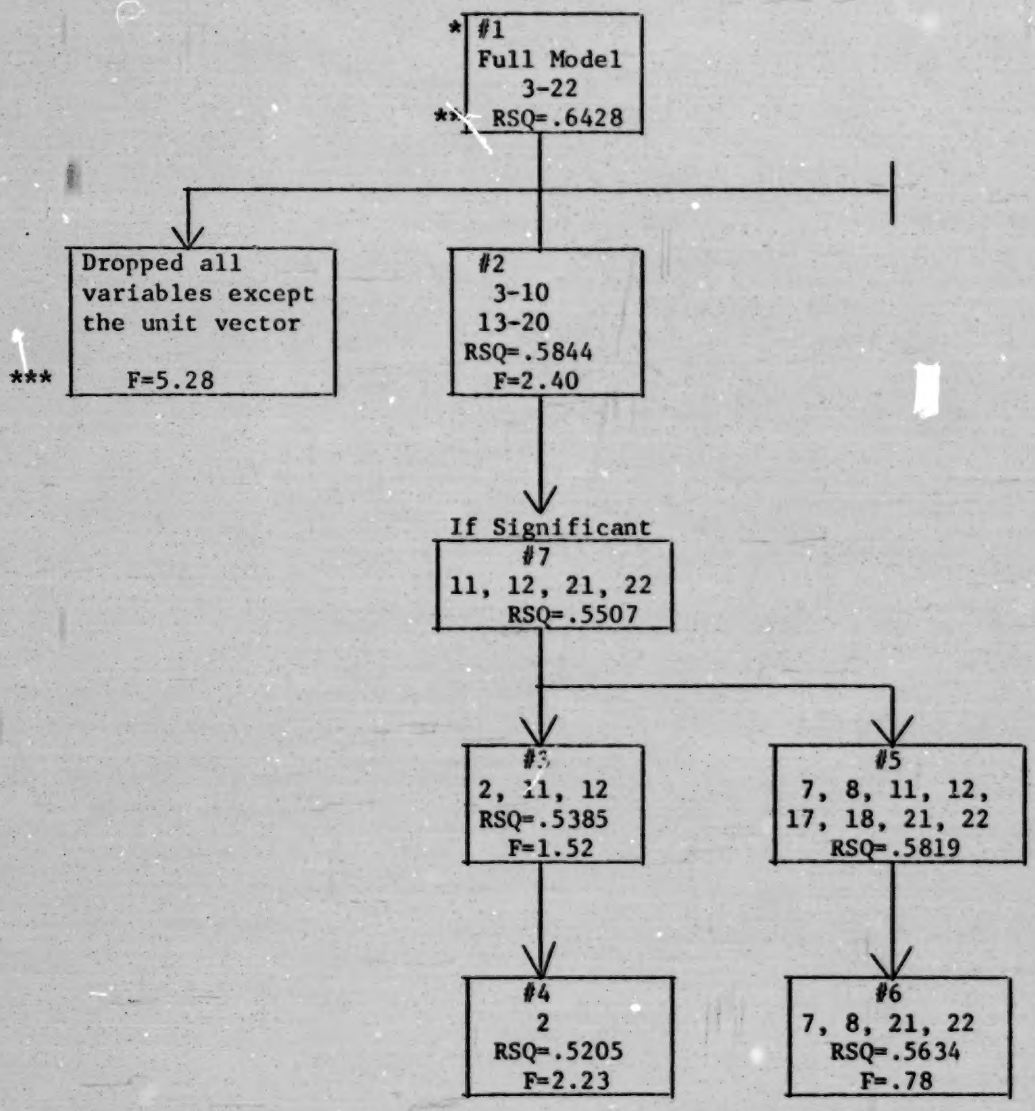
FIRST COMPARISON OF READING CONTROL AND EXPERIMENTAL GROUPS




* Numbers refer to variables indicated on Table I
** RSQ - Refers to Regression Step-down Quotient
*** F refers to the F ratio of significance

CHART 2

INTERACTION WITH READING EXPERIMENT AND CONTROL GROUPS

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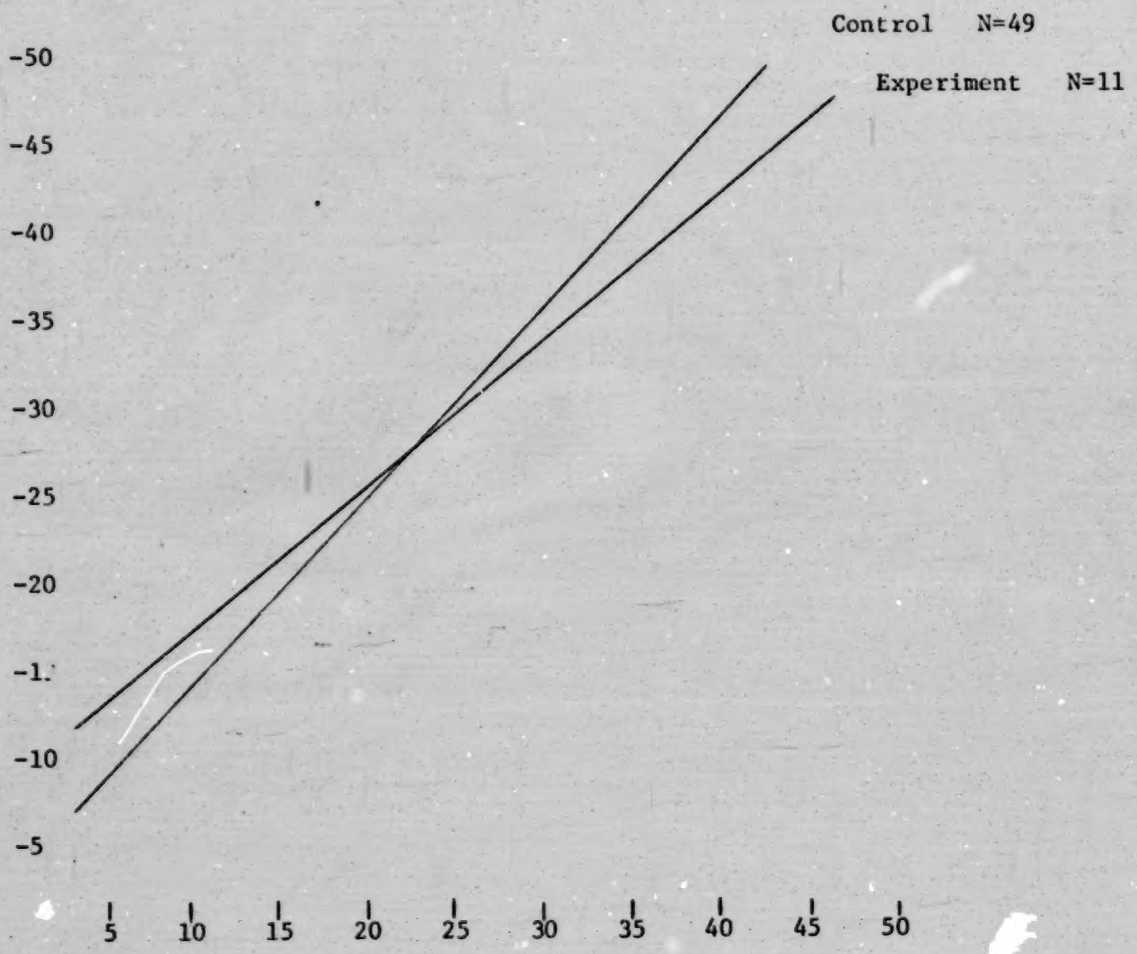

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TABLE III
CORRELATIONS FOR THE EXPERIMENTAL GROUP ONLY - READING

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | | | | | | | | | | | |
| 2 | .72 | 1.00 | | | | | | | | | | |
| 3 | -.25 | -.34 | 1.00 | | | | | | | | | |
| 4 | .25 | .34 | -1.00 | 1.00 | | | | | | | | |
| 5 | .21 | .10 | -.18 | .18 | 1.00 | | | | | | | |
| 6 | -.21 | -.10 | .18 | -.18 | -1.00 | 1.00 | | | | | | |
| 7 | -.17 | -.04 | -.14 | .14 | .31 | -.31 | 1.00 | | | | | |
| 8 | .17 | .04 | .14 | -.14 | -.31 | -.31 | 1.00 | 1.00 | | | | |
| 9 | -.06 | .01 | -.10 | .10 | .24 | -.24 | .84 | -.84 | 1.00 | | | |
| 10 | .06 | -.01 | .10 | -.10 | -.24 | .24 | -.84 | .84 | -1.00 | 1.00 | | |

In the tutored group the pretest scores explained 72% of the post test scores, with the effects of the types of tutors relegated to explaining the remainder.

Anglo tutors (3) showed an inverse relationship for both retest and pretest scores, which was predictable since virtually all subjects were Chicanos. Opposite sex tutors (6), surprisingly, showed an inverse relationship, although it was very weak. The correlations between high school and college tutors and pre and post test scores were very low (.06) but directionally, the signs changed from pre to post testing.

Means and Standard Deviations

Table IV shows the means and standard deviations when comparing pre and post test scores in the experimental and control group. Table V then shows the means and standard deviations for the experimental group alone.

TABLE IV

| Variable | Mean | Std. Dev. | Number of Subjects |
|---|---|---|---|
| 1 | 34.38 | 12.94 | 60 |
| 2 | 25.72 | 11.03 | 60 |
| | t=3.945 | | |

TABLE V

| Variable | Mean | Std. Dev. | Number of Subjects |
|---|---|---|---|
| 1 | 33.63 | 12.77 | 49 |
| 2 | 25.94 | 11.50 | 49 |
| | t=3.132 | | |

Thus, when the control group was dropped from the analysis, the post scores tended to become slightly more tightly clustered about a mean score, which was slightly lower. This might be expected after tutoring. Both t values were significant.

Regression Analysis

The First Comparison. The first comparison was made to make certain that there was a significant difference between pre and post test scores between the control and experiment groups. Chart 1 gives the sequence of testing. The numbers in each box show the variables which were retained in the model along with the appropriate coefficient of determination (RSQ) and F ratio score. The full model was compared to the zero model to note any significant differences between the full model and a mean value estimate of the criterion variable (the unit vector). As shown in the chart the RSQ = .6428 with an F ratio = 5.28. The second comparison was between the full model and model 2 which had variables 11, 12, 21, 22 dropped from the equations to determine whether they uniquely

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contributed to the full model. The RSQ = .5844, but the F ratio = 2.40, which was significant at the .0797 level.

Although the general level of RSQ's in the full model is relatively low, and although the restricted model "explained" only approximately 6% of the variation, the more important point here may be the significance, because this indicates a difference between experiment and control group scores.

Since sufficient significance was indicated, an interaction test was made by comparing model 7 to model 3. The interaction variable accounted for only .0122 of the variation but again F = 1.52, which was significant at the 22% level. This indicated a relatively low level of interaction, but yet enough to raise concern. One possible explanation is that the schools in which the students were tested reflected different levels of student abilities and these tended to distort pre and post test scores. In order to check this hypotheses, model 5 was compared to model 6. Parochial and public school vectors were now included with the experiment and control variables. When the latter variables were dropped from the model, the unique contribution was only .0185, which the F ratio = 0.78. Apparently, there is no significant difference between the experimental and control group and parochial and public school students. A check of the students in the control group indicated that 12 had been tested in public schools, while 10 had been tested in parochial schools.

Another possibility is that the better students had been inadvertently placed in the control group, and thus the higher experimental scores correlated with these. There was no way to test this possibility without rechoosing the control students.

In any event further study is recommended to study the tutoring effects between schools.

The somewhat unsatisfactorily high level of interaction tends to distort the true mean differences between the experiment and control group; despite this, however, it was decided to test for main effects. Model 3 was collapsed into model 4. Only .0183 was uniquely explained by dropping group membership; however, the F ratio = 2.23, which was significant at .1371. When the pretest scores were dropped, this accounted for most of the RSQ and was highly significant.

The important point to be made here is that the level of significance is the important criterion by which this model is to be measured. Post test scores are not to be predicted based on experiment or control grouping. The only thing that was necessary for this model was that there be a significant difference between the control and experimental group to allow further analysis to be conducted on the experimental group. Cross validation was not deemed necessary here because prediction was not per se the issue.

The Second Comparison. Despite the interactions which were generated in the first set of comparisons, it was decided to perform further analysis on the experimental group only. The object here was to determine if membership in any one of four groups would predict post test scores. The groups were: (1) Anglo tutors vs. Chicano tutors; (2) tutors of the same sex vs. tutors of the opposite sex; (3) parochial school vs. public school students; and (4) college tutors vs. high school tutors.

Chart 3 shows the development of the analysis for this set of comparisons. Each of the above groups was systematically dropped from the full mode. Whether the tutor was Chicano or not and whether the tutor was a high school tutor or not was immaterial. The RSQ's and F ratios are shown on the chart.

The unique contribution of the difference between public and parochial school students was .0437 with an F ratio = 1.41, which was significant at .2561. Since the previous analysis showed that further research was necessary to isolate the individual school contributions, this group was dropped from the analysis.

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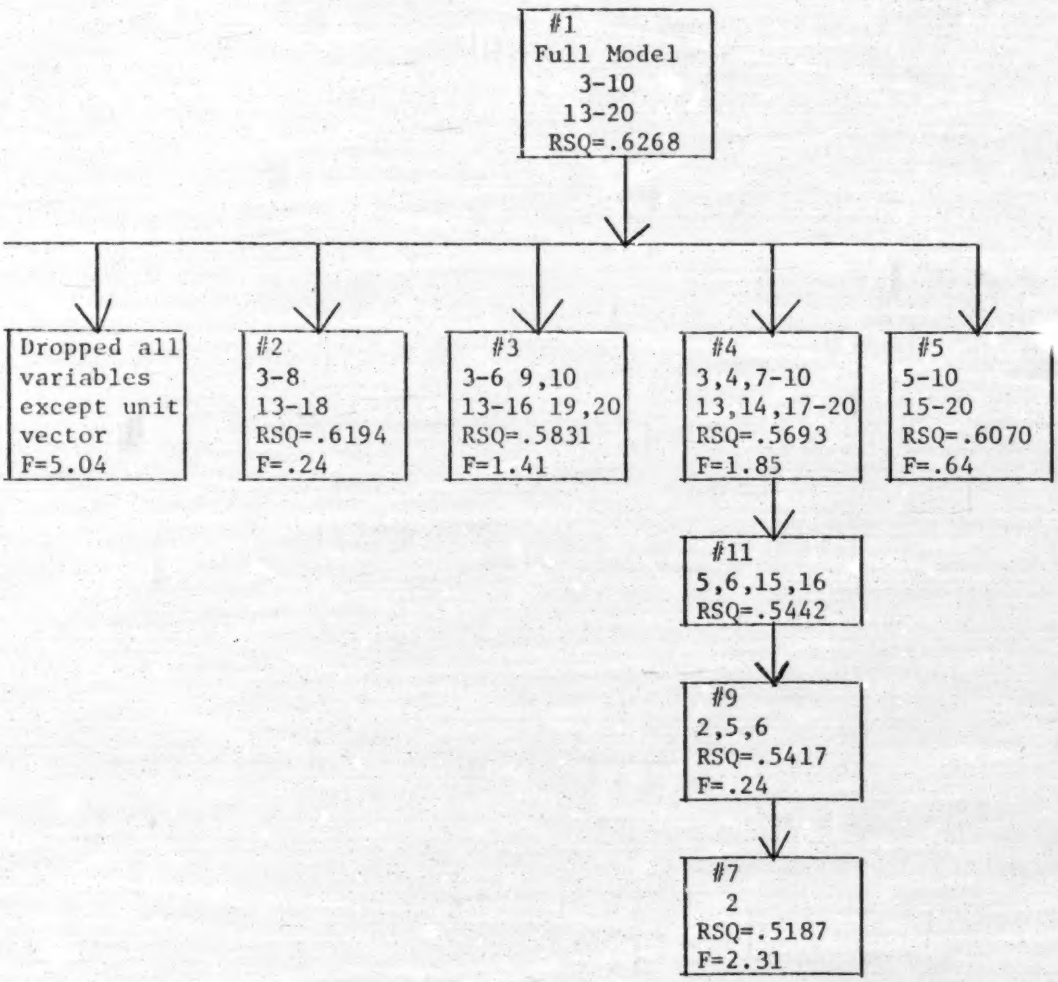
CHART 3

SECOND COMPARISON OF VARIABLE INTERACTION OF READING SUBGROUPS



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Tutors of the opposite and same sex explained 5.75% of the model with an F ratio = 1.85 significant at .1545. This group had greater significance and a greater unique contribution than any of the other groups. It was therefore decided to test this group for interaction and main effects. Model 11 was compared with model 9. This test retained the sex membership vectors but eliminated the interaction variables. The unique ontribution was only .0024 with an F ratio of 0.24. These results allowed the main effects testing wherein model 9 was compared to model 7. The unique contribution of sex group membership was 0.231 or 2.31% with an F ratio = 2.31, significant at .1313. Thus of the four comparisons in the experimental group, only tutors of the same sex showed any reasonable amount of significance.

By eliminating all groups except for the sex group membership and the pretest variable, the model explained 54.17% of the 62.68% of the full model; only approximately 8.5% of the predictive power of the model was lost. The best model for predicting experimental post test scores would then be:

Post test scores = Pretest scores + Tutors of the same sex - Tutors of opposite sex.

Cross Validation

Cross validating the data against the above model gave an RSQ=.32. This poor showing may well be because an n = 14 was used.

Summary and Conclusions

The most striking feature of the analysis was the low RSQ values which were generated with the full model. Since the pretest scores contributed so heavily to the prediction of the post test scores, one must assume that certain key variables were left out. One such variable may be the schools in question. The interactions generated between the experimental and control groups clearly shows, in my view, the need for school comparisons.

Tutors of the same sex apparently have a greater influence on scores then any other group. Thus, when at all possible, boys should be tutored by boys and girls by girls. This conclusion must be tempered by the low RSQ's which attach to the model.

Most surprisingly, Chicano students did not seem to perform significantly better with Chicano tutors. One possible explanation is that the Chicano student is so motivated (by self or parent) that he will respond to anyone who can teach him. Further study is worthwhile here. Perhaps it would be important to know whether Chicano tutors improve post test scores by tutoring in Spanish.

A school-by-school comparison of scores would prove worthwhile, as would a more in depth analysis of the language barriers between Chicano tutors and students.

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B. Second Phase

The arithmetic, or second phase of the tutorial study took place from the onset of school in September, 1972, until February 28, 1973. It yielded significant findings of a positive nature, i.e. that comparison of pre and post test scores of the experimental and control groups showed the experimental group gaining significantly over the control group. This was established in the following manner. Multiple regression technique was used to estimate post-test scores for each group for each test section and their composite total test score. This resulted in these F-ratios and their corresponding probabilities:

TABLE VI

| Pre-Test vs. Post-Test | F-Ratio | Probabilities $P(F \geq F)$ |
|---|---|---|
| Arithmetic Test | | |
| Computation Subtest | 4.25 | .0396 |
| Concepts Subtest | 2.61 | .1059 |
| Applications Subtest | 10.14 | .0024 |
| Total Score | 9.17 | .0035 |

Of course, because a sequential F-testing process was used, these probabilities must be considered a guide only. However, these results do appear sufficiently convincing so as to allow assumption of significant, non-chance differences between experimental and control groups.

The ANOVA multiple regression approach was applied to the data in an attempt to isolate possible variables having an effect upon tutoring. The following were investigated: sex of tutees, sex of tutors, interaction, by sex, of tutor and tutee (m to m, m to f, f to m, f to f), schools attended by tutees, school of origin of tutors. None of these variables were found significant at a level worthy of reporting here. Slight trends toward significance for sex and school may prove useful as guides toward further research.

It may be summarized that for the arithmetic tutorial research, the only significant finding was the global one. That is, tutored pupils performed significantly better on the CTBS arithmetic subtests than did their control group peers.

Appendix E lists all arithmetic research data. To preserve anonymity, all tutors and tutees are listed by their initials only, followed by an m or f in parentheses to indicate sex. Those children without a tutor listed in front of their names are control group members. Only data from those tutees who are sequentially numbered was used in the statistical analysis.

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Looking back, probably the most surprising finding, in light of the major original investigative thrust, was the lack of difference between Anglo and Chicano tutors in reading. This may be due to a number of factors, such as possible lack of concern among third graders for the ethnic identities of older students, or the failure of tutees themselves to have strongly developed ethnic identities. It could also be that an over-riding concern with reading for its own sake on the part of tutees cast ethnic and other ancillary tutorial relationship factors into the background. The fact that very few tutees could speak Spanish or would admit to this ability may well be related to the lack of ethnic variable significances in the reading study.

A second rather surprising finding was the greater success of same sex as opposed to cross-sex reading tutors. This runs in the face of some published research in the counseling field which showed cross-sex counseling more successful than same-sex. It also partially clashes with some time-honored subjective beliefs alleging that primary pupils prefer male teachers. The most likely explanation for this finding is that tutees looked upon their tutor as a "pal" (hence same-sex preference), rather than as an educational professional, similar to teachers and counselors.

The next area for speculation is this--if same/cross sex factors influence reading tutoring, why didn't a like trend appear for arithmetic? The most logical explanation occurring to this writer is that tutoring of reading is probably a more affectual process than that of arithmetic. Thus, tutor variables such as sex (the "pal" effect) maybe more important in the learning of reading than in that of arithmetic, where purely cognitive functions are stressed to a higher degree. This explanation also could account for the lack of any other tutor variable effects being present in arithmetic tutorial relationships.

In closing it must be explained why no attempt was made to report tutee gains in grade equivalent scores, although these are easily computable from the data utilized. This was not done for three reasons. 1) Tutees were initially chosen in a subjective manner, i.e. teacher belief that they were "behind" in reading or arithmetic. Therefore, it is consistent with this approach to report statistical findings as well in a more global manner. 2) The thrust of this entire study was to investigate factors within the tutorial process, not to decide the worth of tutoring itself. 3) Reporting of grade equivalency scores in educational research often tends to create illusions of false accuracy, causing utilization of statistical information in ways test producers never intended.

Finally, directions for further research maybe delimited. One likely tack is to attempt replication of the same sex/cross sex finding with other pupil populations, perhaps using different grade levels, tutor types, and academic subjects. Another possible project would be a follow-up study of the experimental and control groups of the present study when they are in grade 5 or 6. For instance, do the reading and arithmetic gains found among tutees in the present study erode over time? This has been the finding of some follow-up studies in the counseling and guidance field, and it would be interesting to determine whether this gradual diminution of gains also occurs over time in the tutorial relationship.

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APPENDIX A

THE LIST OF SCHOOLS FROM WHICH STUDENTS TO BE TUTORED WERE DRAWN

| School | Type of School | Area Level of Income |
|---|---|---|
| Assumption (both studies) | Parochial | low |
| Baker (both studies) | Public | low |
| Berkeley Gardens (first study only) | Public | low |
| Fairview (first study only) | Public | middle |
| Gregory Hill (first study only) | Public | high |
| Guardian Angels (both studies) | Parochial | low |
| Holy Cross (second study only) | Parochial | high |
| Holy Trinity (second study only) | Parochial | middle |
| McElwaine (both studies) | Public | middle |
| Metz (first study only) | Public | middle |
| North Star (second study only) | Public | high |
| Presentation (both studies) | Parochial | low |
| St. Catherine's (both studies) | Parochial | middle |
| St. Dominic's (both studies) | Parochial | low |
| St. Patrick's (first study only) | Parochial | low |
| Sherrelwood (both studies) | Public | middle |
| Thornton (both studies) | Public | middle |
| Westminster (second study only) | Public | middle |

THE LIST OF SCHOOLS FROM WHICH TUTORS WERE DRAWN

| Institution | Type | Study |
|---|---|---|
| Regis College | Parochial | both |
| Westminster High School | Public | both |
| Ranum High School | Public | first only |
| Meritt Hutton High School | Public | both |
| Marycrest High School | Parochial | second only |
| Holy Family High School | Parochial | second only |
| Regis High School | Parochial | second only |

APPENDIX B

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TEACHER'S NAME: _____ SCHOOL: _____

TEACHER PRE-QUESTIONNAIRE

"Do you have any boys or girls in your class or pod whom you believe are performing in arithmetic below grade level or experiencing some form of arithmetic problem? If so, list their names and birth dates below, and after each, please comment upon his or her specific arithmetic problem."

| | NAME | BIRTH DATE | ARITHMETIC PROBLEM DESCRIPTION |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

Please use the back of the paper for additional comments.

APPENDIX C

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REGIS COLLEGE
WEST 50TH AND LOWELL BOULEVARD
DENVER, COLORADO 80221
433-8471

February, 1973

Dear Principal,

Below you will find the results of the arithmetic section of the Comprehensive Test of Basic Skills which was given to a group of your third graders envolved in our tutorial program.

CTBS Arithmetic form _____, given _____

| NAME | COMPUTATION %ile grade equiv. | CONCEPTS %ile grade equiv. | APPLICATION %ile grade equiv. | TOTALS %ile grade eq |
|---|---|---|---|---|

Thank you for your cooperation with our program. If you have any further questions regarding the test scores or any other aspect of the study, please feel free to call this office (433-8471, ex. 341).

The CTBS Comprehensive Tests of Basic Skills - Reading, removed due to copyright restrictions

Sincerely,

GGD/gaf

Dr. Glen G. Dahlem

APPENDIX E

ARITHMETIC TUTORS MASTER LIST

| Tutor | School | Child | School | PRETEST RAW SCORES Comp. | Con. | App. | Tot. | POST TEST RAW SCORES Comp. | Con. | App. | Tot. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J. A. (f) | Merritt Hutton Public | 1. L. P. (f) | Thornton Public | 15 | 3 | 3 | 21 | 16 | 11 | 9 | 36 |
| J. A. (f) | Merritt Hutton | 2. B. M. (f) | Thornton | 18 | 5 | 3 | 26 | 18 | 21 | 7 | 46 |
| | | 3. J. L. (f) | Thornton | 22 | 6 | 4 | 32 | 15 | 6 | 8 | 29 |
| J. T. (f) | Merritt Hutton | 4. G. K. (m) | North Star Public | 27 | 4 | 3 | 34 | 36 | 21 | 4 | 62 |
| C. W. (f) | Merritt Hutton | 5. G. C. (m) | North Star | 13 | 9 | 0 | 22 | 41 | 9 | 6 | 56 |
| M. C. (f) | Merritt Hutton | 6. R. S. (m) | North Star | 15 | 8 | 6 | 29 | 23 | 11 | 7 | 41 |
| S. H. (f) | Merritt Hutton | 7. J. H. (m) | North Star | 15 | 9 | 3 | 27 | 20 | 12 | 8 | 40 |
| D. D. (f) | Merritt Hutton | 8. C. C. (f) | North Star | 17 | 7 | 3 | 27 | 23 | 12 | 6 | 41 |
| J. A. (f) | Merritt Hutton | 9. J. M. (f) | North Star | 15 | 5 | 7 | 27 | 49 | 13 | 5 | 67 |
| | | 10. R. J. (m) | North Star | 37 | 20 | 13 | 70 | 40 | 18 | 14 | 72 |
| | | 11. D. G. (f) | North Star | 19 | 13 | 0 | 32 | 32 | 21 | 7 | 60 |
| | | 12. C. A. (f) | North Star | 15 | 9 | 6 | 30 | 30 | 13 | 6 | 49 |
| | | 13. J. M. (f) | North Star | 15 | 5 | 7 | 27 | 23 | 8 | 4 | 35 |
| M. S. (f) | Regis College Catholic | 14. A. T. (m) | Baker Public | 4 | 1 | 0 | 5 | 27 | 4 | 3 | 34 |
| D. F. (f) | Westminster High Public | 15. L. H. (f) | Baker | 16 | 10 | 5 | 31 | 14 | 5 | 6 | 25 |
| M. A. (f) | Regis College | 16. S. S. (m) | Baker | 11 | 7 | 4 | 22 | 13 | 4 | 5 | 22 |
| | | 17. J. R. (m) | Baker | 1 | 0 | 0 | 1 | 23 | 7 | 5 | 35 |
| | | 18. D. M. (f) | Baker | 13 | 1 | 0 | 14 | 36 | 8 | 0 | 44 |
| | | 19. R. D. (m) | Baker | 21 | 6 | 4 | 31 | 31 | 8 | 5 | 44 |
| | | 20. L. B. (f) | Baker | 18 | 6 | 4 | 28 | 19 | 11 | 7 | 37 |
| | | 21. S. M. (f) | Baker | 12 | 7 | 4 | 23 | 23 | 4 | 3 | 30 |
| | | 22. J. T. (f) | Baker | 12 | 6 | 4 | 22 | 23 | 6 | 3 | 32 |
| | | 23. R. D. (m) | Baker | 19 | 4 | 5 | 28 | 27 | 19 | 12 | 58 |
| M. A. (f) | Regis College | 24. P. D. (m) | Baker | 16 | 1 | 0 | 17 | 29 | 13 | 9 | 51 |
| E. B. (f) | Regis College | 25. C. T. (f) | Baker | 16 | 1 | 0 | 17 | 20 | 7 | 8 | 35 |
| | | 26. D. S. (f) | Baker | 16 | 5 | 4 | 25 | 32 | 6 | 3 | 41 |
| J. M. (f) | Regis College | 27. R. L. (m) | Baker | 11 | 8 | 7 | 26 | 21 | 5 | 4 | 30 |
| C. S. (f) | Westminster High | 28. R. H. (m) | Westminster Public | 25 | 10 | 4 | 39 | 31 | 11 | 10 | 52 |
| | | 29. S. B. (m) | Westminster | 19 | 6 | 7 | 32 | 30 | 10 | 10 | 50 |
| | | 30. D. B. (f) | Westminster | 22 | 20 | 13 | 55 | 32 | 25 | 12 | 69 |
| K. Z. (m) | Westminster High | 31. S. M. (m) | Westminster | 15 | 7 | 5 | 27 | 13 | 4 | 5 | 22 |
| W. T. (f) | Westminster High | 32. P. V. (f) | Westminster | 13 | 9 | 3 | 25 | 19 | 24 | 10 | 53 |
| | | 33. J. P. (m) | Westminster | 18 | 9 | 6 | 33 | 29 | 10 | 5 | 44 |
| | | 34. D. M. (m) | Westminster | 15 | 7 | 8 | 30 | 26 | 15 | 5 | 46 |

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ARITHMETIC TUTORS MASTER LIST


| Tutor | School | Child | School | PRETEST RAW SCORES Comp. | Con. | App. | Tot. | POST TEST RAW SCORES Comp. | Con. | App. | Tot. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 35. R. K. | (m) Westminster | 20 | 12 | 6 | 38 | 26 | 10 | 5 | 41 |
| | | 36. S. T. | (m) Westminster | 15 | 8 | 3 | 26 | 25 | 5 | 5 | 35 |
| | | 37. T. P. | (m) Westminster | 14 | 8 | 7 | 29 | 25 | 10 | 3 | 38 |
| | | 38. T. G. | (f) Sherrelwood Public | 13 | 9 | 5 | 27 | 42 | 13 | 7 | 62 |
| | | 39. P. H. | (m) Sherrelwood | 12 | 10 | 1 | 23 | 22 | 20 | 4 | 46 |
| | | 40. G. L. | (f) Sherrelwood | 14 | 2 | 0 | 16 | 18 | 10 | 4 | 32 |
| | | 41. J. C. | (f) Sherrelwood | 15 | 4 | 5 | 24 | 27 | 8 | 3 | 38 |
| | | 42. A. C. | (m) Sherrelwood | 17 | 4 | 2 | 23 | 18 | 6 | 2 | 26 |
| | | 43. L. P. | (f) Sherrelwood | 17 | 4 | 5 | 26 | 21 | 15 | 7 | 43 |
| | | 44. D. L. | (m) Sherrelwood | 12 | 10 | 6 | 28 | 21 | 11 | 6 | 38 |
| | | 45. S. C. | (m) Sherrelwood | 13 | 1 | 0 | 14 | 23 | 9 | 7 | 39 |
| | | 46. L. M. | (m) Sherrelwood | 18 | 6 | 5 | 29 | 21 | 9 | 3 | 33 |
| | | 47. D. C. | (f) Sherrelwood | 22 | 12 | 4 | 38 | 28 | 12 | 2 | 42 |
| | | 48. C. H. | (f) Sherrelwood | 16 | 19 | 4 | 39 | 45 | 20 | 11 | 76 |
| | | 49. B. B. | (m) Sherrelwood | 12 | 9 | 4 | 25 | 28 | 16 | 6 | 50 |
| | | 50. D. M. | (m) Sherrelwood | 9 | 7 | 0 | 16 | 23 | 8 | 4 | 35 |
| | | 51. E. B. | (m) Sherrelwood | 11 | 4 | 0 | 15 | 17 | 3 | 6 | 26 |
| | | 52. D. D. | (f) Sherrelwood | 16 | 7 | 6 | 29 | 20 | 8 | 5 | 33 |
| | | 53. D. R. | (m) Sherrelwood | 19 | 0 | 0 | 19 | 25 | 5 | 0 | 30 |
| | | 54. J. B. | (m) McElwaine Public | 28 | 11 | 14 | 53 | 40 | 21 | 13 | 74 |
| | | 55. J. S. | (m) McElwaine | 9 | 7 | 10 | 26 | 21 | 6 | 6 | 33 |
| | | 56. B. A. | (m) McElwaine | 27 | 5 | 8 | 40 | 28 | 20 | 13 | 61 |
| | | 57. K. L. | (f) McElwaine | 44 | 11 | 8 | 63 | 45 | 11 | 8 | 64 |
| | | 58. C. M. | (f) McElwaine | 33 | 3 | 5 | 41 | 17 | 8 | 7 | 32 |
| | | 59. G. M. | (m) McElwaine | 20 | 6 | 3 | 29 | 37 | 18 | 10 | 65 |
| | | 60. S. S. | (m) McElwaine | 17 | 11 | 6 | 34 | 13 | 6 | 6 | 25 |
| | | 61. D. J. | (m) McElwaine | 17 | 12 | 9 | 38 | 18 | 12 | 5 | 35 |
| | | 62. M. C. | (m) McElwaine | 16 | 6 | 6 | 28 | 45 | 19 | 14 | 78 |
| | | 63. R. C. | (m) McElwaine | 30 | 11 | 7 | 48 | 43 | 14 | 4 | 61 |
| | | 64. D. H. | (f) McElwaine | 24 | 15 | 6 | 45 | 40 | 11 | 8 | 59 |
| | | 65. C. D. | (m) McElwaine | 18 | 14 | 3 | 35 | 28 | 13 | 4 | 55 |
| | | 66. M. F. | (f) McElwaine | 17 | 12 | 6 | 35 | 14 | 4 | 7 | 25 |
| | | 67. J. K. | (m) McElwaine | 26 | 13 | 5 | 44 | 28 | 10 | 5 | 43 |
| | | 68. R. B. | (m) McElwaine | 15 | 6 | 7 | 28 | 14 | 9 | 4 | 27 |
| | | 69. T. C. | (m) St. Catherine Catholic | 12 | 12 | 13 | 37 | 28 | 18 | 13 | 59 |
| M. H. | (m) Regis High Catholic | 70. R. A. | (m) St. Catherine | 10 | 11 | 1 | 22 | 22 | 9 | 5 | 36 |
| J. H. | (m) Regis High | 71. G. A. | (f) St. Catherine | 11 | 8 | 6 | 25 | 51 | 18 | 10 | 79 |
| K. R. | (f) Marycrest High Catholic | | | | | | | | | | |

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ARITHMETIC TUTORS MASTER LIST
Page 3

| Tutor | School | Child | School | PRETEST RAW SCORES Comp. | Con. | App. | Tot. | POST TEST RAW SCORES Comp. | Con. | App. | Tot. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J. J. (f) | Marycrest High | 72. L. G. (f) | St. Catherine | 23 | 10 | 10 | 43 | 52 | 24 | 15 | 91 |
| L. H. (f) | Marycrest High | 73. A. C. (f) | St. Catherine | 21 | 7 | 6 | 34 | 36 | 17 | 11 | 64 |
| N. A. (f) | Marycrest High | 74. T. L. (f) | St. Catherine | 19 | 9 | 6 | 34 | 34 | 14 | 9 | 57 |
| D. R. (f) | Westminster High | 75. L. M. (m) | Holy Trinity Catholic | 22 | 16 | 8 | 44 | 47 | 19 | 11 | 77 |
| D. R. (f) | Westminster High | 76. C. D. (f) | Holy Trinity | 18 | 14 | 2 | 34 | 39 | 14 | 11 | 64 |
| K. I. (f) | Westminster High | 77. L. J. (f) | Holy Trinity | 18 | 5 | 4 | 27 | 29 | 17 | 16 | 62 |
| K. I. (f) | Westminster High | 78. D. B. (m) | Holy Trinity | 18 | 7 | 6 | 31 | 35 | 19 | 9 | 63 |
| J. S. (f) | Westminster High | 79. J. B. (f) | Holy Trinity | 14 | 10 | 6 | 30 | 25 | 12 | 6 | 53 |
| R. S. (m) | Holy Family High Catholic | 80. J. R. (m) | Holy Family Catholic | 13 | 1 | 6 | 20 | 18 | 5 | 5 | 28 |
| R. S. (m) | Holy Family High | 81. P. M. (f) | Holy Family | 10 | 9 | 6 | 25 | 25 | 13 | 5 | 43 |
| | | 82. P. C. (f) | Holy Family | 22 | 12 | 10 | 44 | 47 | 21 | 13 | 81 |
| | | 83. J. G. (m) | Holy Family | 11 | 7 | 3 | 21 | 42 | 21 | 15 | 78 |
| L. R. (f) | Merritt Hutton | 84. J. L. (m) | Holy Cross Catholic | 22 | 20 | 14 | 56 | 52 | 26 | 18 | 96 |
| C. R. (f) | Merritt Hutton | 85. G. L. (f) | Holy Cross | 19 | 17 | 10 | 46 | 32 | 20 | 13 | 65 |
| | | 86. K. M. (f) | Guardian Angels Catholic | 8 | 7 | 1 | 16 | 12 | 7 | 3 | 22 |
| | | 87. M. S. (m) | Guardian Angels | 23 | 5 | 1 | 29 | 15 | 10 | 5 | 30 |
| | | 88. T. F. (m) | Guardian Angels | 19 | 8 | 10 | 37 | 15 | 23 | 10 | 48 |
| | | 89. M. Z. (m) | Guardian Angels | 18 | 12 | 6 | 36 | 22 | 11 | 1 | 34 |
| | | 90. D. W. (m) | Guardian Angels | 42 | 15 | 10 | 67 | 47 | 23 | 16 | 86 |
| | | 91. L. M. (f) | Guardian Angels | 16 | 15 | 8 | 39 | 20 | 16 | 6 | 42 |
| | | 92. G. S. (m) | Guardian Angels | 19 | 11 | 11 | 41 | 18 | 13 | 10 | 41 |
| T. J. (m) | Regis College | 93. B. M. (m) | Assumption Catholic | 23 | 7 | 6 | 36 | 56 | 17 | 14 | 87 |
| S. W. (f) | Regis College | 94. R. G. (f) | Assumption | 26 | 3 | 6 | 35 | 21 | 12 | 2 | 35 |
| | | G. P. (m) | Thornton | 22 | 6 | 4 | 32 | | MOVED | | |
| | | A. S. (m) | North Star | 27 | 9 | 5 | 41 | | MOVED | | |
| | | P. S. (m) | North Star | 19 | 9 | 6 | 34 | | MOVED | | |
| | | K. L. (m) | North Star | | REPLACED MOVER | | | 10 | 12 | 8 | 30 |
| | | L. L. (m) | North Star | 28 | 2 | 8 | 38 | | MOVED | | |
| | | R. D. (f) | Baker | 23 | 0 | 0 | 23 | | MOVED | | |
| | | D. R. (f) | Baker | 10 | 1 | 0 | 11 | | MOVED | | |
| | | J. L. (m) | Westminster | 23 | 9 | 6 | 38 | | MOVED | | |
| | | J. L. (m) | Westminster | 16 | 7 | 4 | 27 | | MOVED | | |
| | | R. L. (m) | Sherrelwood | 7 | 3 | 0 | 10 | | MOVED | | |
| | | T. C. (f) | Sherrelwood | 15 | 6 | 0 | 21 | | MOVED | | |

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ARITHMETIC TUTORS MASTER LIST


| Tutor | School | Child | School | PRETEST RAW SCORES Comp. | Con. | App. | Tot. | POST TEST RAW SCORES Comp. | Con. | App. | Tot. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | J. J. (m) | Sherrelwood | 18 | 8 | 5 | 31 | | MOVED | | |
| | | J. C. (m) | McElwaine | 16 | 11 | 7 | 34 | | MOVED | | |
| | | J. E. (m) | St. Catherine | 17 | 12 | 9 | 38 | | MOVED | | |
| | | P. R. (f) | Holy Trinity | | REPLACED MOVER | | | 28 | 12 | 6 | 46 |
| | | G. B. (m) | Holy Cross | 27 | 11 | 8 | 46 | | MOVED | | |
| | | M. D. (f) | Holy Cross | 12 | 14 | - | - | 19 | 11 | 5 | 35 |
| | | R. S. (m) | Guardian Angels | | REPLACED MOVER | | | 14 | 5 | 3 | 22 |
| | | T. R. (m) | Assumption | | REPLACED MOVER | | | 32 | 7 | 11 | 30 |
| | | B. C. (f) | Assumption | | REPLACED MOVER | | | 38 | 7 | 6 | 51 |
| | | J. W. (m) | Assumption | | REPLACED MOVER | | | 46 | 9 | 3 | 58 |
| C. C. (f) | Marycrest High | B. C. (m) | St. Dominic Catholic | | REPLACED MOVER | | | 36 | 13 | 3 | 52 |
| J. P. (m) | Regis High | E. C. (f) | St. Dominic | | REPLACED MOVER | | | 15 | 11 | 5 | 31 |
| | | B. H. (f) | St. Dominic | | REPLACED MOVER | | | 35 | 16 | 14 | 65 |
| J. D. (m) | Regis | A. A. (f) | St. Dominic | | REPLACED MOVER | | | 15 | 10 | 3 | 28 |
| | | P. M. (m) | Assumption | | REPLACED MOVER | | | 25 | 14 | 8 | 47 |
| | | M. P. (m) | St. Dominic | | REPLACED MOVER | | | 7 | 0 | 0 | 7 |

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